Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in this application.

Listing of Claims:

1. (***Currently Amended***) An apparatus for exciting and detecting NQR in a substance containing quadrupole nuclei responsive to the NQR phenomenon, comprising:

~~A coil for irradiating~~ an irradiator to irradiate an item that may contain a substance with RF waves to excite NQR in quadrupole nuclei within the substance and ~~for receiving~~ to receive an NQR signal emitted in response thereto;

a ~~transmitting means for producing and transmitting~~ transmitter to produce and transmit an RF pulse to the ~~probe~~ irradiator to create said RF waves;

a ~~receiving means~~ receiver to receive and treat a received signal from said ~~probe~~ irradiator for subsequent processing and detection of a said NQR signal therein;

~~sensing means for sensing~~ a sensor to sense an extraneous parameter or parameters that may influence the detection of the NQR signal from the item to be ~~scanned~~ irradiated prior to operation of the transmitter and to generate a sensor signal corresponding to the extraneous parameter or parameters sensed; and

a ~~computer for processing~~ processor to process the sensor signal to control the operation of the transmitter depending on the sensor signal prior to creating said RF waves, and to control the operation of the receiver, to facilitate the excitation and detection of an NQR signal, and to process the treated received signal to identify ~~a said~~ an NQR signal therein~~, and control the transmitting means and the receiving means in response to said processing means and said sensing means to optimise the excitation and detection of the NQR signal~~.

2. (***Currently Amended***) An apparatus as claimed in claim 1, wherein ~~said computer~~ the extraneous parameter or parameters include temperature and the processor is adapted to ~~direct the transmitting means~~ control the transmitter and the ~~probe~~ irradiator to irradiate the item ~~at~~ in a range of NQR frequencies that lie close to the NQR frequency of the substance containing quadrupole nuclei to be detected, as adjusted in accordance with the sensed temperature ~~measured by said temperature probe~~.

3. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the ~~sensing means~~ sensor is a temperature probe for sensing the ~~detected temperature is the~~ ambient room temperature.

4. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the ~~detected temperature is~~ sensor is a temperature probe for sensing the external building temperature.

5. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the ~~detected temperature is~~ sensor is a temperature probe for sensing the ~~scan item~~ external temperature of the item.

6. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the ~~detected temperature is~~ sensor is a temperature probe for sensing the ~~scan item~~ internal temperature of the item.

7. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the ~~detected temperature is some~~ sensor is a temperature probe for sensing a combination of one or more of the ambient room temperature, the external building temperature, the external item temperature ~~&~~ and the internal item temperature.

8. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein a thermal image of the item is used to determine its temperature and detect excessively hot or cold ~~scan~~ items.

9. (***Currently Amended***) An apparatus as claimed in claim ~~1~~ 2, wherein the temperature ~~detected~~ sensed originates from a probe ('tag') attached to the ~~bag~~ item.

10. (***Currently Amended***) An apparatus as claimed in claim 1, further comprising an RF probe, wherein ~~an~~ the RF probe is used to monitor any RF emissions from the item ~~to be scanned~~ prior to ~~it being scanned~~ irradiation of the item.

11. (***Currently Amended***) An apparatus as claimed in claim 1, wherein sensors are used to determine the height and length of ~~a scanned~~ the item prior to ~~it being scanned~~ irradiation of the item.

12. (***Currently Amended***) An apparatus as claimed claim 1, wherein said ~~sensing means~~ sensor comprises a probe that is able to detect RF emissions from ~~an~~ the item and send RF emission signals representative thereof to the ~~NQR device~~ processor, the ~~NQR device having processing means~~ processor being operable to monitor the RF emission signals and to provide an indication that the item is not suitable for NQR detection if the RF emissions from an item containing a sample exceed a prescribed threshold level~~, a signal is provided indicating that the item is not appropriate for NQR detection~~.

13. (***Currently Amended***) An apparatus as claimed in claim 1, wherein said ~~sensing means~~ sensor comprises an RF antenna that ~~may be~~ is able to be excited with pulses of RF energy to irradiate ~~an~~ the item and receive return signals after a period of dead time, the ~~NQR device having processing means~~ processor being operable to measure and transform the return signals into frequency space**[[,]]** and, if the

return signal detected at the transmit frequency exceeds a predetermined threshold, ~~signal~~ indicate the presence of a significant amount of metal.

14. (***Currently Amended***) An apparatus as claimed ~~In~~ in claim 1, wherein said ~~sensing means~~ sensor comprises a plurality of RF antennas, one RF antenna being continuously excited with RF energy to irradiate an item to be ~~scanned~~ irradiated and the other RF antenna(s) being disposed to receive a signal in respect of the excited RF energy and null it out, thereby keeping the RF antenna in induction balance in the absence of any disturbance, and sensing such disturbance as may be caused by a metallic object to detect same.

15. (***Currently Amended***) An apparatus as claimed in claim 1, wherein said ~~sensing means~~ sensor comprises one or more metal imagers for creating an image of any metal objects ~~detected~~ sensed within an item to be ~~scanned~~ irradiated.

16. (***Original***) An apparatus as claimed in claim 15, wherein said metal imagers comprise a multiple of coils arranged in a linear 1D, planar 2D or box shaped 3D array.

17. (***Currently Amended***) An apparatus as claimed in claim 16, wherein said metal imagers generate a metallic image by using long wavelength RF (1-100khz) signals.

18. (***Currently Amended***) An apparatus as claimed in claim 16, wherein said metal imagers generate a metallic image by using microwave energy (high MHz-GHz) signals.

19. (***Currently Amended***) An apparatus as claimed in claim 1, wherein said apparatus is interconnected with an X-ray machine, whereby the X-ray machine is used to detect metal objects in the item to be ~~scanned~~ irradiated.

20. (***Original***) An apparatus as claimed in claim 19, wherein the X-ray machine provides 2D or 3D X-ray images to identify metal objects.

21. (***Currently Amended***) An apparatus as claimed in claim ~~19, as dependent upon claim 18,~~ 18, interconnected with an X-ray machine, whereby the X-ray machine is used to detect metal objects in the item to be irradiated, wherein the X-ray image is combined with the microwave image to identify metallic objects not well identified by one or the other image.

22. (***Currently Amended***) An apparatus as claimed in claim 1, wherein the ~~computer~~ processor is adapted to monitor the resonant frequency and system Q as an item to be ~~scanned~~ irradiated is moved into the ~~coil~~ irradiator, and process Q profiles to identify the existence of metallic objects within the item.

23. (***Currently Amended***) An apparatus as claimed in claim 1, wherein the ~~computer~~ processor is adapted to change the operating frequency of the irradiating RF energy to detect certain metallic objects that are not easily detectable at low frequencies, and comparing measurements at these different operating frequencies to ascertain the presence of said certain metallic ~~object~~ objects.

24. (***Currently Amended***) ~~An apparatus for exciting and detecting NQR in a substance containing quadrupole nuclei responsive to the NQR phenomenon substantially as herein described with reference to the accompanying drawings as appropriate~~ A method of exciting and detecting NQR in a substance containing quadrupole nuclei responsive to the NQR phenomenon, the method comprising the steps of:

irradiating an item that may contain a substance with RF waves to excite NQR in quadrupole nuclei within the substance and receiving an NQR signal emitted in response thereto;

producing and transmitting an RF pulse to create said RF waves;

receiving and treating a received signal for subsequent processing and detection of a said NQR signal therein;

sensing an extraneous parameter or parameters that may influence the detection of the NQR signal from the item to be irradiated prior to the transmission and generating a sensor signal corresponding to the extraneous parameter or parameters sensed; and

processing the sensor signal to control the transmission of the RF pulse in dependence upon the sensor signal prior to creating said RF waves, and controlling the receiving and treating of the received signal, to facilitate the excitation and detection of an NQR signal, and processing the treated received signal to identify an NQR signal therein.

25. (***Currently Amended***) A method ~~for exciting and detecting NQR in a substance containing quadrupole nuclei responsive to the NQR phenomenon substantially as herein described with reference to the accompanying drawings as appropriate~~ as claimed in claim 24, wherein the extraneous parameter or parameters include temperature and the irradiation of the item is in a range of NQR frequencies that lie close to the NQR frequency of the substance containing quadrupole nuclei to be detected, as adjusted in accordance with the sensed temperature.

26. (***New***) A method as claimed in claim 25, wherein the temperature is the ambient room temperature.

27. (***New***) A method as claimed in claim 25, wherein the temperature is the external building temperature.

28. (***New***) A method as claimed in claim 25, wherein the temperature is the external temperature of the item.

29. (***New***) A method as claimed in claim 25, wherein the temperature is the internal temperature of the item.

30. (***New***) A method as claimed in claim 25, wherein the temperature is a combination of one or more of the ambient room temperature, the external building temperature, the external item temperature, and the internal item temperature.

31. (***New***) A method as claimed in claim 25, wherein the method comprises the further step of using a thermal image of the item to determine its temperature and detect excessively hot or cold items.

32. (***New***) A method as claimed in claim 25, wherein the temperature is sensed by a probe ('tag') attached to the item.

33. (***New***) A method as claimed in claim 24, further comprising the step of monitoring any RF emissions from the item prior to irradiation of the item.

34. (***New***) A method as claimed in claim 24, further comprising the step of determining the height and length of the item prior to irradiation of the item.

35. (***New***) A method as claimed claim 24, further comprising the steps of: detecting RF emissions from the item; and monitoring the RF emissions to provide an indication that the item is not suitable for NQR detection if the RF emissions from an item containing a sample exceed a prescribed threshold level.

36. (***New***) A method as claimed in claim 24, wherein the irradiation of the item is implemented by pulses of RF energy to irradiate the item and return signals are received after a period of dead time, the return signals being measured and transformed into frequency space, wherein the method comprises the further step of detecting if the return signal is at the transmit frequency and exceeds a

predetermined threshold, thereby indicating the presence of a significant amount of metal.

37. (***New***) A method as claimed in claim 24, wherein the irradiation of the item is implemented by continuous excitation with RF energy using an RF antenna, and the method comprises the further step of receiving a signal in respect of the excited RF energy and nulling it out, thereby keeping the RF antenna in induction balance in the absence of any disturbance, and sensing such disturbance as may be caused by a metallic object to detect same.

38. (***New***) A method as claimed in claim 24, comprising the step of creating an image of any metal objects sensed within an item to be irradiated using one or more metal imagers.

39. (***New***) A method as claimed in claim 38, wherein said metal images are generated using long wavelength RF (1-100khz) signals.

40. (***New***) A method as claimed in claim 38, wherein said metal images are generated using microwave energy (high MHz-GHz) signals.

41. (***New***) A method as claimed in claim 24, wherein metal objects in the item to be irradiated are detected using X-rays.

42. (***New***) A method as claimed in claim 41, wherein the X-rays are used to generate 2D or 3D X-ray images to identify metal objects.

43. (***New***) A method as claimed in claim 41, wherein metal objects in the item to be irradiated are detected using X-rays in combination with a microwave image to identify metallic objects not well identified by one or the other image.

44. (***New***) A method as claimed in claim 24, wherein the method comprises the further steps of monitoring the resonant frequency and system Q of the item and processing Q profiles to identify the existence of metallic objects within the item.

45. (***New***) A method as claimed in claim 24, wherein the method comprises the further steps of changing the operating frequency of the irradiating RF energy to detect certain metallic objects that are not easily detectable at low frequencies, and comparing measurements at these different operating frequencies to ascertain the presence of said certain metallic objects.

46. (***New***) An apparatus for exciting and detecting NQR in a substance containing quadrupole nuclei responsive to the NQR phenomenon, comprising:

means for irradiating an item that may contain a substance with RF waves to excite NQR in quadrupole nuclei within the substance and to receive an NQR signal emitted in response thereto;

means for producing and transmitting an RF pulse to the irradiating means to create said RF waves;

means for receiving and treating a received signal from said irradiating means for subsequent processing and detection of a said NQR signal therein;

means for sensing an extraneous parameter or parameters that may influence the detection of the NQR signal from the item to be irradiated prior to operation of the transmitting means and to generate a sensor signal corresponding to the extraneous parameter or parameters sensed; and

means for processing the sensor signal to control the operation of the transmitting means depending on the sensor signal prior to creating said RF waves, and to control the operation of the receiving means, to facilitate the excitation and detection of an NQR signal, and to process the treated received signal to identify an NQR signal therein.